Declaration of Rita Vachani

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I, Rita Vachani, declare and state:

Declarant's Background

1. I am the Manager of the Analysis and Planning Systems Department at GTE Laboratories Incorporated (GTE Labs). GTE Labs is the central research and development facility for GTE. The work performed at GTE Labs supports the ongoing technical needs of the company and includes new network technologies and new services. My department is responsible for providing support to GTE business units in the areas of network routing, dimensioning and planning – both for the local loop and the backbone network – across a wide range of technologies. I received my Ph. D. in Operations Research from M. I. T. in 1987 and have been working at GTE Labs since then. My work over the last eleven years has been primarily in the area of network design and analysis. I have published several papers in the network design area. I also serve as an Associate Editor for the Telecommunications Area of the INFORMS Journal on Computing, and as a referee for several professional journals.

Review of Hyperion Survey

2. I have read the document entitled "Investigation of ISP Interstate Traffic For Selected Internet Applications" by J. Williams and K. Sochats (University of Pittsburgh. January 19, 1999), attached to the Reply Comments of Hyperion Telecommunications. Inc. on Petitions for Reconsideration, CC Docket No. 98-79 (filed January 19, 1999) (Hyperion Survey). I submit this declaration in support of GTE's Motion to Strike Hyperion's Reply Comments and the Survey.

1

3. The Hyperion Survey indicates that its purpose was to investigate what fraction of telecommunications network usage is interstate for ADSL-based connections to the Internet. The Survey employs the following ratio: total transmission time for inter-state content download during a "session"/connect time for a session.

4. This ratio is not useful in a packet-switched environment. In a packet-switched world, with an ADSL connection from the home to the ISP (via a phone company's central office), network resources are not utilized constantly throughout the holding time of an Internet session. In fact, a significant portion of the session time is spent reading and interacting with information contained solely in the user's terminal. During these host-only times, no network resources, interstate or intrastate, are being utilized and, therefore, they should not be counted to determine what portion of the overall time during which the network is used involves interstate communications. The correct measurement of relative use is: interstate network usage/total network usage.
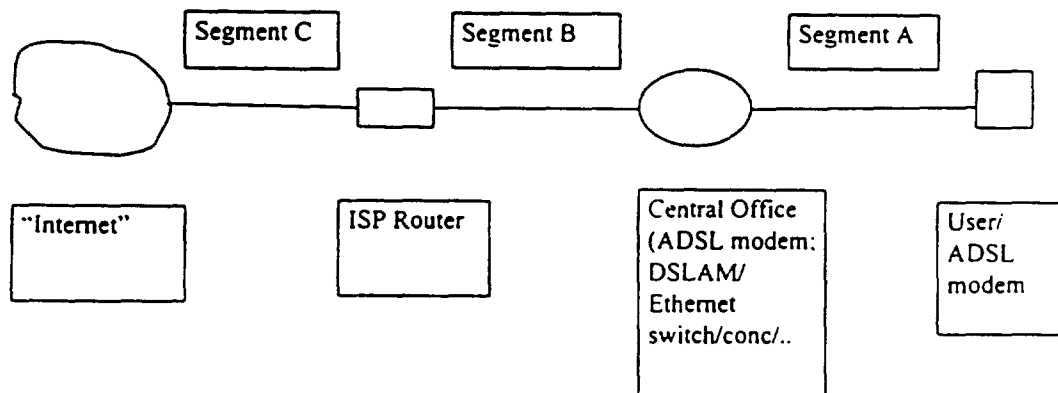
5. To understand the difference between circuit- and packet-switched environments, consider a typical connection from a user's location to the Internet, using an ADSL connection, as shown in Figure 1 (this figure is from the Cisco web site: www.cisco.com/warp/public/779/adsl_sd.htm). The ADSL connection is considered to be always "on" and is shared between data (Internet connection) and voice.

Figure 1 : Asymmetric Digital Subscriber Line technology
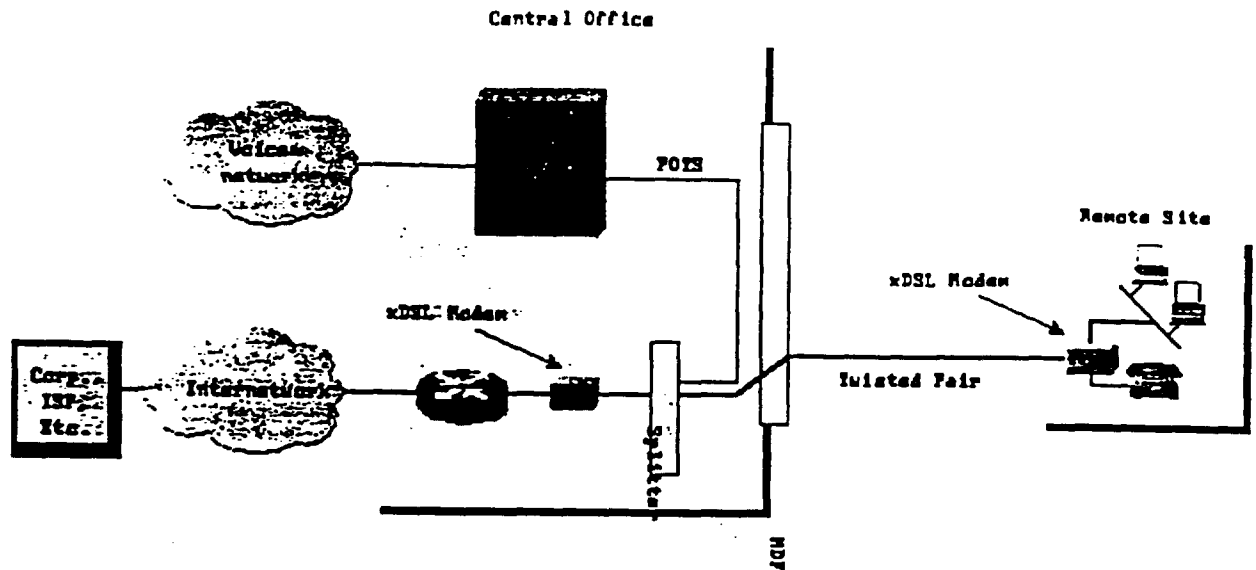
Central Office

The data connection can be segmented into the following network parts:

Figure 2

Segment C	Segment B	Segment A

| "Internet" | ISP Router | Central Office (ADSL modem: DSLAM/ Ethernet switch/conc/.. | User/ ADSL modem |

6. In Figure 2, the ADSL connection is established between the ADSL modems located at both ends of the connection between the user premises and the central office. This connection from the user premises to the central office is made over the copper pair of the local loop. This segment is shared between data (Internet connection) and voice. A

3

splitter in the central office separates the voice and the data traffic; the data part of the traffic is routed to an ADSL modem at the central office and the voice traffic is transmitted to the voice switch. This connection is identified as "segment A."

7. The data traffic is routed from the ADSL modem at the central office via a DSLAM/ethernet switch/concentrator, also located at the central office, to the user's ISP router (and from there to a server that provides the user the desired service). The connection to the ISP router is often over a frame relay or asynchronous transport mode connection. This connection is shared between many users and is identified as "segment B."

8. The connection from the ISP router to the application server that the user wants to access can vary considerably depending on the user's application and what type of use the customer is making of the Internet. These application servers exist throughout the country and the world (and include those that belong to the user's ISP), and hence could involve intrastate or interstate connections. ISPs often locate their servers, including those providing their authentication function, in central locations to reduce equipment costs and create network efficiencies. For purposes of this description, I have included both the ISP's server and other Internet server locations together in the same segment. This segment is identified as "segment C' in Figure 2.

9. Using this diagram of the various connections used in Internet communications, the following description shows how network resources are utilized during a simple Internet session that includes email and web browsing applications (the two applications included in the Hyperion Survey).

<p align="center">Log-on</p>

10. First, the user "logs on" to his or her Internet service provider and a small

amount of traffic is generated between the user and an ISP server (via the CO and the ISP router) to establish the connection (to authenticate user, etc.). This traffic uses segments A. B and C. Once this connection is established, there is no more traffic being transported on any segment until the user (or the application client) requests some service over the Internet. even though Hyperion's proposed "holding time" clock of the Internet session is ticking. Note that the user may use "non-Internet" applications, such as word processing software, during this session, none of which generate traffic on the network. Now consider the use of email and web browsing applications during this session.

Email

11. The user opens the email client and requests service, such as by clicking on the button for "check for new email messages." This request is directed to the mail server from which the user wants to retrieve unread messages: it could be the ISP's mail server or another mail server (such as the employer's mail server) where the user has a mail account. This request generates traffic on segments A. B and C. Once the email messages are downloaded to the user's terminal, no more traffic is generated on any of segments A. B or C, until the user initiates a new request. Reading a downloaded email message on a user terminal (part of the average "holding time" of 31.74 minutes in the Survey, Section 3.1) does not generate traffic over the network -- unlike a voice call over a circuit-switched line. which remains open until the connection is terminated by hanging up the phone.

12. Similarly, when the user is composing a reply to an email or writing a new message, the user terminal is in use but no traffic is generated on segments A. B or C. However, this time is part of the "holding time" as defined by this Survey and is used to

compute the ratio of interstate traffic. This is an incorrect measure of interstate usage because traffic is generated only when the user requests the "send message" service.

13. Based on these facts about how an ADSL connection in an email application works, it is clear that the Survey uses an incorrect measure of the relative traffic for interstate vs. intrastate communications. Given that the time that traffic is generated on the network will be considerably less than the "holding time" data used in the Survey, the actual amount of relative use of the network for interstate communications is considerably higher. Although the Survey does not contain sufficient data to compute these percentages, the interstate use would clearly be well over 10 percent, even in the context of the flawed Hyperion Survey.

14. The Survey's comment that "we excluded individuals that keep an email session open all day" because that would bias the results in favor of intrastate traffic seemingly attempts to show how unbiased the Survey's methodology is. In reality, the statement only demonstrates the introduction of bias into the Survey where none should have existed. Keeping the mailer open as long as the user is connected to the ISP is common practice, and in no way determines the fraction of traffic that is interstate because traffic is generated only while downloading and sending e-mail. Typically, the user will set up his or her mailer to automatically check for new messages at a specified frequency, such as every ten minutes, and traffic associated with that request will be generated at that specified frequency, rather than throughout the session.

Web Browsing

15. Web browsing generates traffic in a manner that is similar to an email application. The user requests connection to a web server of his or her choice by typing or

selecting a URL "address." This request generates traffic on segments A, B, and C and the selected web page is downloaded to the user's terminal from the destination server (this web page may be stored or "cached" in an ISP's server that may or may not be located in the same state as the user). Once the page is downloaded, no more traffic is generated on any of segments A, B or C until the client initiates a new request. The time spent by the user to read a downloaded page does not generate traffic over the network. The Survey thus erroneously includes this time in its meaningless "holding time" figure. Thus, in this case it is also clear that the Survey uses an incorrect measure and significantly underestimates the relative fraction of "web browsing" traffic that is interstate. Again, although the Survey does not have sufficient information from which to make a more meaningful comparison, the relative amount of interstate use, when compared to total interstate and intrastate network usage, would be substantially higher than 10 percent, even in the context of the skewed Hyperion Survey.

Other Comments

16. The Survey also concludes that intrastate Internet usage will be relatively higher in the future because download times will become faster in the future. For example, the Survey seems to argue that, since the time taken to download a message/file over a DS0 line is 24 times as much as that over a T1 line, the relative amount of interstate traffic would be 24 times as much when a DS0 line is used rather than a T1 line. This conclusion is clearly wrong. More rapid download would decrease interstate and

intrastate communication times equally, thus it is likely these technological changes would have little impact on the jurisdictional ratio of the traffic. Obviously, as demonstrated earlier, holding time is an inaccurate measurement for determining relative interstate and intrastate usage.

I declare, under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on _February 16, 1999_

Rita Vanham

Declaration of Carl Holmberg

DECLARATION OF CARL HOLMBERG

I, Carl Holmberg, declare and state as follows:

Declarant's Background

1. I am a Divisional Engineer in the Network Architecture group with GTE Internetworking. I have been with BBN, now part of GTE, from 1987 to the present with duties most currently focusing on network performance analysis statistics. I was previously an architect for Network Switching Systems, a telecommunications startup company (1984-1987). Prior to that, I was employed by Tymshare in the Tymnet Development group where I was responsible for the "network supervisor," the central control and monitoring agent for this networking technology (1979-1984). While at BBN, I have given review input for journal submissions in areas related to digital communications. I have a BA in mathematics from UC Berkeley and a MS in cognitive/experimental psychology from Carnegie Mellon University, where I was a Ph.D candidate (completed all but dissertation). My background in statistical work includes performing statistical data analysis for large class action legal cases, as a consultant to the law firm of Berger, Kapetan & Malakoff, Pittsburgh, PA (1978-1979). I taught mathematics at the high-school and college level in the Peace Corps, where I also worked on economic/data modeling for the manpower section of the 3rd Five Year Plan in Ethopia. .

INTRODUCTION

2. I have reviewed the 24 page paper entitled "Investigation of ISP Interstate Traffic For Selected Internet Applications" by J. Williams and K. Sochats (University of Pittsburgh, January 19, 1999) ("Survey").[1] The Survey is an attempt by the authors to refute the assertion that the amount

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[1] See Reply Comments of Hyperion Telecommunications, Inc. on Petitions for Reconsideration, CC Docket No. 98-79, Exhibit A (filed January 19, 1999)

of interstate traffic for Internet applications does not meet the <u>de minimis</u> amount of 10% interstate traffic volume on telecommunications data access lines (ADSL in particular).

3. This Survey fails to meet the most basic criteria for model formulation, model and data presentation, experimental design and statistical hypothesis testing. In short, the entire train of logic -- from the original misformulation of the problem, through experimental design, execution of the experiment and evaluation and presentation of the results -- is flawed at every stage. The remainder of this declaration provides both general and specific criticisms of the Survey. No doubt many of the flaws in the Survey can be attributable to one fundamental point: with today's technology it is impossible to determine with any precision the interstate versus intrastate usage of customers utilizing GTE's ADSL service to access the Internet.

GENERAL CRITICISMS

4. The metrics chosen for measurement in the Survey are inappropriate for the hypothesis being tested. The Survey's authors do not directly measure actual Internet communications resources used on the access line. Rather, they resort to a variety of indirect measurement mechanisms (including self-reporting) that are highly susceptible to introducing bias and error. Rather than use such a troublesome approach to measurement, there are devices that can be used to monitor traffic passing across an interface. Despite the existence of these potential measurement devices, it would still be difficult. if not impossible, to measure directly the end point of an individual user's Internet and email communications.

5. The Survey's authors fail to demonstrate that the population under study is at all representative of the relevant target population. The sample is a very limited population and is not based on random sampling considerations. The sample group is comprised of 86 graduate students in the same graduate studies department as the authors, and 28 other people that they

recruited. This is clearly not a sample designed to represent actual or potential users of GTE's ADSL service, or even the population in general.

6. The behaviors that were studied are not demonstrated to be typical of Internet usage in general, or even typical for the Survey participants' Internet usage outside of the experimental context. The self-reporting procedure itself forces the participant to interact unnaturally with the network because participants must follow a specified "session" model. Also, the mere act of recording time and recording e-mails sent and web sites visited adds an unnatural work component to what is usually an unrestrained activity.

7. There is no demonstration that the actual data sampled represents an unbiased, random sample of subject interactions with the network. Indeed, the data collection procedures introduce numerous possibilities for distortion and systematic bias, since the data is based on self-reports of private behavior to people of significance (i.e., the participants' professors). Participants could readily select, invalidate or discard data, or could modify behavior, for privacy reasons. Along with other steps, the Survey authors could have reduced bias by using a defined, random sampling methodology. Also, the authors could have made sure the measurements themselves were obtained by unbiased mechanisms – such as using measurement through automatic equipment at the access interface. The authors did not take either of these steps to reduce bias in this Survey.

8. The Survey makes reference to, and uses, information and statistics from other sources without demonstrating scientific completeness, accuracy or applicability to the current question. For instance, cache statistics are presented on page 8, citing the URL http://ircache.nlanr.net/Cache/FAQ/ircache-faq-2.html as a source. However, the referenced document merely offers these percentage statistics as declarations, with no supporting data or

references. Also, when I viewed this site on February 5, 1999, the "Research" section of the referenced document consisted only of a header "Research," with no other text. Publication on the WWW does not, in itself, make the publication authoritative or correct.

9. The Survey authors' characterization of their unsubstantiated guesses as "estimates" contravenes sound empirical data analysis and hypothesis testing practices. Properly defined, an "estimate" is based on data, and statistical testing means are used to determine the "error" of the estimate. In section 3.4 of the Survey, the authors attempt to dismiss e-commerce as a significant source of interstate traffic by simply declaring that they "estimate" that less than 10% of it will consist of long distance traffic (because, they claim without proof, it is just like web-browsing). No data, much less direct measurement, is used to substantiate this claim. Accordingly, this is a guess, not an estimate.

10. The Survey does not provide the results of any statistical tests, relevant or not, nor does it provide or directly assert that the data or general conclusions are demonstrably valid. It does not deal with alternative interpretations of the data, as would be expected in a scientific paper. It does not demonstrate that the broad conclusions it provides flow from the information provided, or referenced, within the Survey.

11. The authors' sweeping conclusions about caching (and the use of cache rates to "discount" the interstate traffic information) is not demonstrated to be either relevant or accurate for the purposes of the Survey. Although BBN has had the technical capability to cache for years, it has not determined that it is either cost effective or desirable. Furthermore, the authors apply a cache discount factor to interstate traffic data based on the speculative application of a factor obtained elsewhere, not from direct measurement of caching in the user's system. Also, the discussion (and measurements) do not take into account the fact that content may be marked as

non-cacheable. Dynamically computed content, which is highly attractive since it can be tailored to individual users and which is present during interactive gaming and real-time communications, is in general not cacheable on the end system. The authors do not account for web-browsing content that may have been transmitted, but not cached.

SPECIFIC CRITICISMS

12. The following are, in my opinion, significant specific problems with the Survey. There are a broad range of problems, starting with logic of the Survey (the redefinition of amount of interstate Internet traffic), the lack of scientific procedures and methods, failure to address validity and generalizability issues, and potential bias due to both sampling effects and the study methods themselves. All of these issues are compounded by the complete lack of back-up data. [My colleague, Rita Vachani, has addressed in her declaration the major problems associated with the use of holding and transmission times. In order to avoid repetition, I will leave those issues to her.]

13. The Survey relies on a small sample of students at the same university as the authors, along with other people recruited by these students, who recorded observations about a small number of Internet sessions. There are no grounds for statistically asserting that the data so obtained from these students, in this context, is representative of all Internet access traffic users in general, or of real or potential users of GTE's ADSL service specifically. These populations are the relevant ones according to Hyperion's hypothesis.

14. The Survey examined an average of only 2 email sessions and 1.5 web-browsing sessions per participant. This is insufficient information to measure the typical behavior of each participant. A few self-reported session observations, where the sessions are structured to be unnatural, can hardly be considered a meaningful sample of Internet behavior.

15. No activities other than email and web-browsing were recorded, even though such activities are available and frequently in use on the Internet (*e.g.*, chat groups, interactive gaming, real-time video/voice communications, Internet commerce, etc.).

16. It is unclear how the Internet session observations were distributed over the participants (the majority of the sessions could have been reported by a few participants). Also, no data is provided regarding the variability of behavior between the participants. This information is required to address the question of whether or not even the limited population was properly sampled.

17. There is no foundation for extrapolating the behavior of this limited, homogenous population to users of ADSL service generally, or GTE's ADSL service specifically. These subjects were not ADSL service users. Their motivations and interests may be distinct from the ADSL user population simply because this sample population is so narrowly defined. In fact, the conditions of the experiment did not invite intense use of the Internet, as might be attractive to ADSL service users because of the higher speeds. ADSL is a relatively new offering, and it is reasonable to assume this population of users may exhibit Internet interaction preferences that are driven by the higher speed access that they are purchasing.

18. The Survey was not designed to provide a representative sample of Internet access data. There is no reason to believe that a handful of 86 graduate students and 28 people they have recruited for self-observational reports will provide accurate, much less unbiased, data. The students were not only all from the University of Pittsburgh, they were all graduate students in the Information Science Department, and the remaining subjects were recruited by these students. This is hardly an unbiased sample of Internet users.

19. A truly representative sample would have measured the traffic content for a sample of users throughout the United States, designed to represent the population of actual or potential ADSL users. Furthermore, good measurement techniques would have attempted to make sure the population of transactions sampled and transfer sizes was either complete or unbiased. Geographic location will play a role in determining access paths. There is no reason to believe that either the data access paths for this sample of users, or their usage, is representative of the USA as a whole. For example, do we believe that users in Maine, Alaska, Hawaii, California and Texas would have the same access patterns and data paths as this small population?

20. Issues of systematic bias (intentional or not) can easily arise where, as here, a subject is permitted to discard or invalidate session data for a variety of reasons. Because each participant analyzed so few sessions, it would not be surprising if reporting was selective. Also, it is significant that this Survey exposed each participant's private behavior to people of significance (*i.e.*, their professors). This raises serious questions of self-censorship. Would a subject naturally engage in the same Internet interactions when self-reporting as they would do privately?

21. There is no reason to believe that, consciously or not, the students and their recruited cohorts would be immune to trying to please their Professors. Of particular interest is whether these subjects could have known or guessed the position the authors were intending to take in this Survey. Scientific experiments are typically designed to reject the "null hypothesis." If this hypothesis became evident or inferable to the participants, this would be grounds itself for dismissing the Survey.

22. In this case, not only is the behavior of students potentially open to bias, but the data itself is open to distortion since it is self-reported. The students have the option of ignoring "session data" based on a variety of criteria. For example, participants were allowed the freedom

to discard session information simply if they forgot the start or stop times (page 14). Longer sessions may more likely be discarded because of interruptions or memory failures. Participants also were instructed to discard sessions if.an interstate site could not be "pinged" (page 14). So here, we may be discarding interstate observations but not "intrastate" observations. Whether or not to reply to pings is something that can be controlled by the destination host or fire-wall functions and this may be geographically non-uniform. Also, participants were to discard any site "when no physical address could be determined" (p. 14). There is no reason to believe that failure to find an address for a "site" does not introduce bias.

23. The determination that a site was "out-of-state" was made by the participants. Leaving this key determination up to the discretion of the participants is open to gross bias – the address associated with a page (such as a vendor's address) is often unrelated to where the WWW page is actually being hosted. Furthermore, there is no necessary systematic relationship between IP address and the geographic location of the server where the data is stored.

24. The Survey authors seem to assume that all traffic received by a user when accessing a WWW page comes from the site where the original page was located. This is far from the truth – WWW pages can be peppered with links that draw in images, for instance, from other sites.

25. The Survey authors specifically rely exclusively on interactions that involve the user requesting data. There is no meaningful treatment of how to accurately identify or attribute transfers not specifically initiated by the user. For example, the authors ignore "push" technology sources of data, and seem to assume that all Internet data arrives in direct response to an end user's query (a distortion of the client/server model). In fact, the source of data delivered via push technology may not be obvious. Such data is not necessarily delivered in response to specific user queries.

26. The treatment of session time under the Survey is artificially limited because it does not allow for Internet activity overlap. The authors imposed this restriction on the behavior of their subjects – *i.e.*, participants were assumed to be performing only one network interaction at any one time. IP networking enables an individual to perform transactions such as retrieving email and browsing the WWW simultaneously. Assuming no overlap thus represents a distortion.

27. It is not clear that Internet behavior irrelevant to the stated objective of the Survey is eliminated from the data. Typically, large campus settings like the University of Pittsburgh have systems that allow intra-site communication without use of external access lines. Did the Survey eliminate all intra-site communications (*i.e.*, those that do not exit the university system), including email?

28. The use of "ping times" to determine transmission times is not demonstrated to be accurate or meaningful, and is likely to introduce errors. The potential for error, when using ping-time measurements to formulate a hypothetical computation of transmission time, was not treated either in the model or in the data analysis. Pings may or may not be directed to the same destinations as the actual data, and in any case may poorly represent data communication delays. For instance, routers can use per-protocol filtering methods to forward packets, so it is possible that pings would be treated differently, or might even end up at different destinations. Also, UDP packets may or may not receive the same forwarding treatment as TCP packets. Large TCP transfers (large pages, file FTPs) involve a different protocol and timing than do pings. As mentioned above, responding to pings is discretionary. There is no reason to believe that failure to receive ping responses is unbiased.

29. The Survey did not actually measure Internet traffic either in terms of elapsed time (the Survey authors' own metric) or actual bytes transmitted or received. TCP transactions require

round-trip communications, possible retransmissions of packets and packet overhead. Elapsed transaction time was not actually measured. Furthermore, the data content does not include packet overhead, which can be quite large and which is necessary for transporting the packets (it contains, for instance, IP address information – without which the packets cannot be delivered to their targets). The authors failed to account for this overhead, or for actual behavior on the access interface.

30. The data analysis is insufficient for hypothesis testing. The stated purpose of the Survey is to reject the hypothesis that the interstate content of traffic passed on ADSL lines is greater than 10%. To do so in a scientific manner, statistical tests must be provided, and these tests must be demonstrated to be appropriate and to meet typical standards for confidence. No such tests were conducted.

31. No confidence intervals are provided for descriptive statistics.

32. Another consideration that affects data interpretation is the variability of behavior expressed by an individual (which will help us understand the sample sizes needed in order to properly represent individual behavior). It is important to have an estimate of underlying observation variability in order to determine how representative we may consider sampled data to be. There is no treatment of variability of measurement, the sources of that variability, or how that variability should be treated and interpreted. Indeed, this issue can not be addressed given the small number of samples taken. Variability analysis is critical for hypothesis testing, since a treatment of noise that may exist in data is essential for hypothesis testing.

33. In any scientific experiment that performs measurements, a basic question is what variability exists in the data and what accounts for that variability. Providing a model that partitions the variability, and an appropriate analysis that places confidence bounds around statistics derived

from data is a common method for addressing the issue of noise (*i.e.*, unexpected variation) in data. These methods are typically based on a treatment of the variability in the data. There is no such treatment offered in the Survey.

34. The structure of the data is not sufficiently described to determine to what extent the data may be driven by a small number of individuals that are not even representative of the subject population. Just because there were 114 participants does not mean that each participant contributed equally or even in proportion to their normal Internet access activities. Only 231 email sessions were analyzed and only 172 WWW browsing sessions were analyzed. This yields ratios of sessions/participant of 2.03 and 1.51 respectively. These small ratios imply no diversity of observations even if the data were evenly distributed over the users. So it cannot be claimed that the data represents "usual" or "typical" behavior of individuals.

35. Furthermore, the Survey does not indicate how the actual observations were distributed over individuals. Did a small number of individuals dominate the data? Were the sessions not analyzed equivalent to those analyzed? We do not know.

36. The Survey does not acknowledge individual differences, which is critical given the small and select sample under study. Does individual behavior in the study population vary widely? If it does, this raises issues related to what factors are really driving the measurements, and whether individual differences are adequately taken into account – particularly given the small number of sessions/participant subjected to analysis.

37. If there were wide individual differences even in this population, given how narrowly it was selected, then this would raise serious questions regarding data treatment since data from individuals were combined without explanation. Such operations may not be appropriate if there

are significant individual differences and individuals are disproportionately represented in the data. Without the data, we simply don't know.

38. The data itself does not appear to be internally consistent. For instance, the e-mail analysis declares that 231 email sessions with 1935 e-mail messages were analyzed. This leads to an average of 8.38 e-mail messages per session. But the table gives 9.06 (4.80 Local Messages +4.26 Long Distance messages). Similarly, for web-browsing sessions, 172 sessions with 356 pingable sites were analyzed. This would yield 2.07 sites per session (extraordinarily low, in my opinion). But the data table indicates 4.97 long distance and 2.63 local sites on the average. So what does this data really mean? What formulas were used? What is the actual basis for the calculations? This information is not provided.

39. Normally, one expects that in an analysis of this type, the Survey would provide sufficient information so that the experiment could be readily replicated and so that no internal data inconsistencies would arise. Here, however, the authors provided no such information.

SUMMARY

41. Given the lack of explanation for the data computations, the sensitivity of the experimental method for introducing bias, and lack of statistical testing, not to mention basic issues with the underlying conceptual model, the data as presented in this Survey does not provide a scientific basis for supporting or rejecting any hypothesis related to the interstate versus intrastate usage of customers utilizing GTE's ADSL service to access the Internet.

I declare, under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on <u>Feb 17, 1999</u>
           (date)

<u>Carl Holmberg</u>
   Carl Holmberg

CERTIFICATE OF SERVICE

I, Judy R. Quinlan, hereby certify that copies of the foregoing "Reply Comments of GTE" have been mailed by first class United States mail, postage prepaid, on April 27, 1999 to the parties on the enclosed list.

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